LOS OSOS WASTEWATER PROJECT – TECHNICAL ADVISORY COMMITTEE

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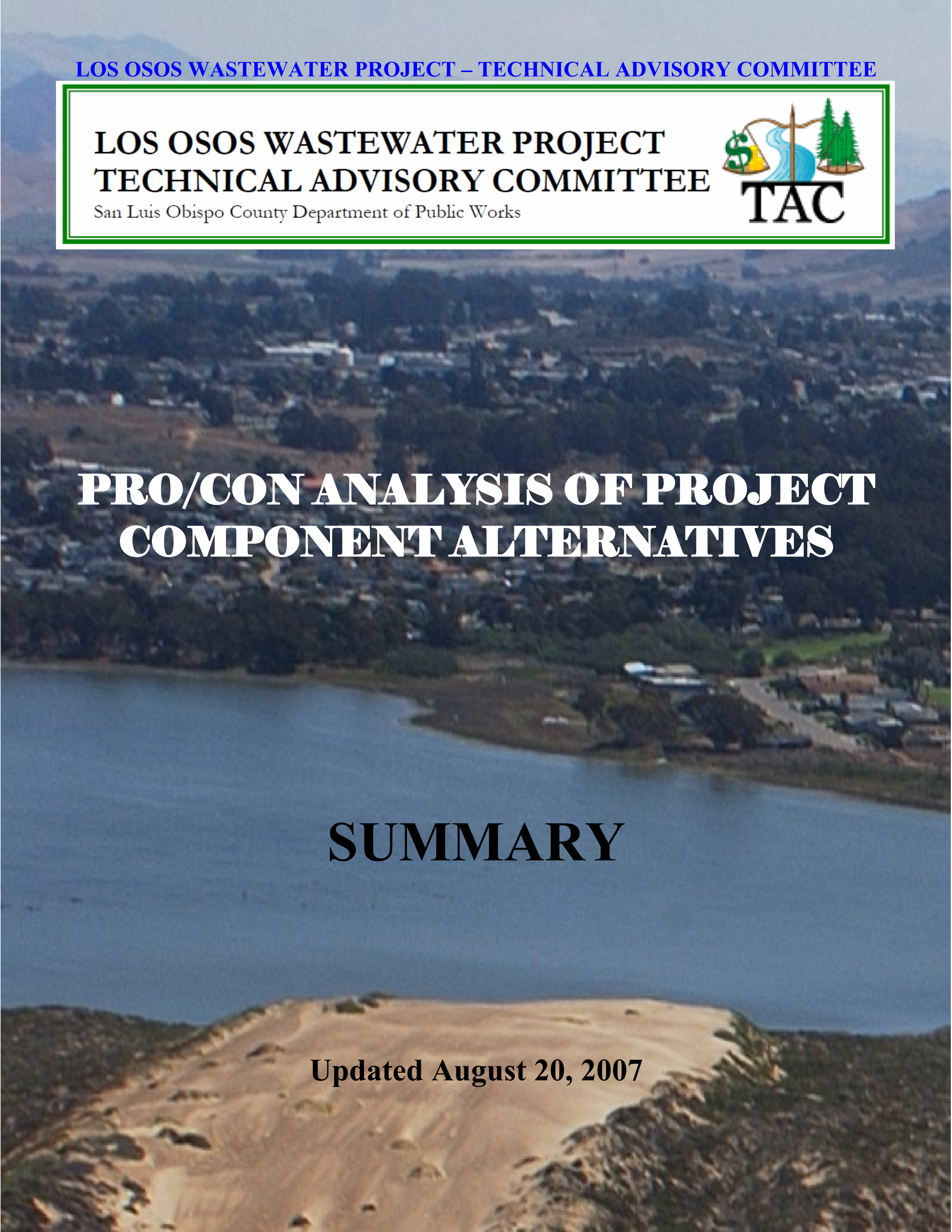
San Luis Obispo County Department of Public Works

TAC



PRO/CON ANALYSIS OF PROJECT COMPONENT ALTERNATIVES

SUMMARY

Updated August 20, 2007

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CORE VALUES	MAJOR CRITERIA
Affordability	• Capital and construction costs • O&M costs • Financing factors • Grant Eligibility • Engineering and project management costs
Environmental Stewardship	• Environmental impacts • Potential risks due to system failure • Carbon footprint
Flexibility	• Flexibility to meet future needs and opportunities, including: expansion, future higher regulations, regional opportunities, etc. • Potential alternative energy opportunities
Sustainability	• Restoring and protecting our groundwater resources • Mitigating seawater intrusion and achieving groundwater balance in the basin • Minimizing energy use • Minimizing sludge production
Community	• Impacts on individual homeowners, residents, and businesses • Stakeholder support • Community acceptance
Controllability	• Risks of third party decisions, policies • Financial risks associated with wastewater projects • Design for maximum system control

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Summary of Sites

The advantages of the out-of-town sites (Cemetery, Giacomazzi, Branin, which are adjacent to each other, as well as others are that a larger site provides greater flexibility in treatment and biosolid technologies, and allows for alternative energy, regional solutions, future expansion and upgrades. They are in close proximity to agriculture for future water exchange and spray fields and/or wetlands that could be utilized as possible disposal options. They are also distant from community centers, and have a lower land acquisition cost. The disadvantages are the additional costs for piping wastewater from the collection area and the return of effluent to the community groundwater basin, and the sites are in the vicinity of a low density residential area.

The advantages of the Tri-W site are that it is central to the collection system and close to the proposed Broderson leach field. However, its downtown location (near library, church, community center) and the high density residential area require that the most expensive treatment technology site improvements and odor controls be employed, Also, there are higher traffic impacts to the community with the hauling of bio-solids offsite and the importation of materials. It has high construction costs, annual O&M, and land value, along with the largest carbon footprint. Its small size limits flexibility for future expansion or upgrade.

SITING	PROS	CONS
East of town sites	• No traffic impacts and are close to LOVR • Minimal site improvements are required, as they are level and suitable for construction • In-town community acceptance • Class III (non-prime) ag land • Low population density • Proximity to spray fields and ag reuse	• Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson • Located in the vicinity of Falcon Ridge, a low density population area south of LOVR
Cemetery	• Adjacent to Giacomazzi: Potential of northern acreage for alternative energy, future expansion, upgrades	• Inadequate footprint to accommodate entire treatment facility • Questionable willingness of seller • Proximity to funeral events, visitors • Proximity to Falcon Ridge, a low density population area
Giacomazzi	• Sufficient acreage to build treatment facility and adjacent to Branin and the Cemetery: • Flexibility for alternative energy, future expansion, upgrades • Screened from LOVR • Willing seller • Farther from Falcon Ridge than the Cemetery property • Falcon Ridge is not in an apparent down wind position from this property	
Branin	• Adjacent to Giacomazzi: Potential for wetland storage, alternative energy, future expansion, upgrades • Farther from Falcon then the Cemetery property • Falcon Ridge is not in an apparent down wind position from this property	• Inadequate footprint to accommodate some types of treatment facilities • Proximity to Warden Lake and Warden Creek
Tri-W	• Already owned by CSD • Site of project already mitigated and tribal agreements in place, which may shorten construction time • Central location reduces cost of collection system • Proximity to potential Broderson leach fields	• Very high land value and mitigation requirements • Small acreage and location in center of town require most expensive treatment and higher costs overall • Limited flexibility for future expansion, upgrades, or alternative energy • Greater risk associated with system failure due to proximity to Bay • Proximity to church, library, community center; high density population area • Traffic impacts in center of town • Greatest distance to spray fields and ag reuse • ESHA – sensitive dune habitat • Partial view obstruction of Morro Rock • Source of community divisiveness

<u>COMMENTS</u>

- All sites are tributary to the Morro Bay National Estuary and pose a potential risk in the event of failure. Tri-W poses a higher risk due to the reduced intervening area and limited on-site storage
- NOTE: It was the unanimous opinion of the NWRI that an out of town site is better due to problematic issues with the downtown site.

Summary of Treatment Technologies

With tertiary and denitrification treatment included, Oxidation Ditch, BIOLAC, and Facultative Ponds are very similar in construction costs and annual O&M. BIOLAC has lower capital costs than Oxidation Ditch, but they both have similar footprints and results. With Gravity collection they require a larger footprint and may cause greater impact on biological and archeological resources.

The advantages of Facultative ponds are that they have the lowest energy usage, and they minimize costs relating to solids treatment and handling. The disadvantage is that ponds require a larger footprint.

The advantage of MBR is that it produces the highest quality of effluent, allowing for greater flexibility in disposal options. It also requires the smallest footprint, which makes it feasible to enclose all aspects of the process. The disadvantages of MBR are that it is the most expensive technology, both in capital costs and annual O&M, and requires the highest energy usage.

TREATMENT	PROS	CONS
Oxidation Ditch	• Small footprint (8 acres) • Energy usage - STEP 800,000 kWh/yr; Gravity 900,000 kWh/yr	• Higher capital costs than BIOLAC
BIOLAC	• Lower capital costs than Oxidation Ditch- • Small footprint (8-10 acres) • Lower energy usage with STEP (800,000 kWh/yr)	• Higher energy usage with Gravity collection (1.1M kWh/yr)
Ponds	• Lowest energy usage (600,000 kWh/yr) • Eliminates cost of solids treatment • Greatly reduces solids production and disposal (dredging required once every 20 years)	• Requires larger footprint (16-20 acres) • May require additional nitrification/denitrificaqtion treatment with STEP • Further investigation is required to determine if ponds release methane gas (more powerful greenhouse gas than CO2) • Greater construction impacts
MBR	• Requires smallest footprint (4 acres) • Higher quality of effluent, suitable for discharge at Broderson leach field • Enclosed facility controls odors	• Highest capital cost • Highest annual O&M • Highest energy usage (1.3M kWh/yr. EIR indicated 2.1M and expected to increase with time) • High construction nuisance in center of town

COMMENTS

- All four treatment methods are proven reliable and will meet the requirements of secondary treatment.
- Tertiary treatment is likely to be required. If draft groundwater recharge regulations are applied in the future, then advanced treatment (beyond tertiary) may be required.
- With full tertiary and denitrification treatment included, there is only a small difference in construction costs and O&M between Oxidation Ditches, Biolac and Facultative Ponds.
- Treatment processes with elements open to the atmosphere have a higher odor potential in the event of system failure. However, such risks can be effectively mitigated through design redundancy and appropriate siting.
- All four treatment methods produce a greater volume of sludge with a gravity collection system.

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Summary of Collection Systems

The advantages of Gravity are that it has lower annual O&M costs and it has less impact on individual properties. The greatest concerns of Gravity are that it has higher capital costs and has greater impacts of construction, i.e. trenching up to 23 feet, dewatering, and longer street closures. There is also a greater potential for infiltration of groundwater and inflow of storm water (I/I). Gravity collection will have permanent impacts due to lift stations and manhole maintenance. Also, Gravity collection results in significantly higher bio-solids handling at the treatment facility.

The advantages of STEP/ STEG are that it has lower capital costs; it provides primary treatment in the septic tank, thereby reducing the costs associated with solids; has less road impacts due to smaller pipe and shallow trenching or directional drilling; and may reduce the risk of archeological impacts and resultant delays. The greatest concerns are with higher annual O&M costs, and impacts on individual properties, both during construction and ongoing, including pumping of septic tanks with attendant odor and traffic.

COLLECTION	PROS	CONS
Gravity	• Lower annual O&M costs for collection • Less on-lot disturbance. • No easement or access required on private property • No requirement to haul septage within the collection area	• Higher capital costs • Longer time to construct • Impact on treatment costs (higher capital costs, and annual O&M) • Increases cost of solids treatment and disposal • Increased risk of I/I over time; may require additional cost of monitoring/ repair program • Requires deeper trenching and dewatering, resulting in need to protect water quality from disposal of collected water, significant soil erosion, traffic nuisance • Higher risk of impacts on archeological resources may result in delays, additional cost • 20 Pump stations have permanent impact, requiring additional footprint and odor control • Greater road impacts resulting in longer closures and traffic nuisance • Gravity collection pipes require cleaning every 2 years ("pigging out") with attendant odors
STEP/STEG	• Lower capital costs • Shorter time to construct • Provides primary treatment in septic tank, thereby reducing down-line costs for treatment system and solids treatment/ disposal • Shallow trenching and Horizontal Directional Drilling (HDD) where feasible, results in less road impacts and traffic nuisance, less risk to archeological resources and associated delays • Requires no lift stations, reducing footprint requirements • Minimal risk of I/I and resulting impact on Flow	• Higher annual O&M costs for collection- • May require additional nitrification/denitrification treatment for disposal options • If SRF loan is used, may require separate electrical connection premium • Construction and permanent impact on individual property, including footprint • Increased risk of impact on archeological resources due to new septic tanks • Nuisance and cost of regular pumping of septic tanks • Potential odor issues of vents if not properly maintained (200-500 collection vents located throughout community) • Higher total on-lot capital costs; unknown amount is homeowner responsibility; may be affected by funding • Individual properties have many active on-lot components including pumps, sensors, alarms that require periodic maintenance and have a greater risk of failure.

COMMENTS

- Note that 63% of trenching in town is less than 10 feet deep; 34% from 10 to 14 feet deep; 2% from 14 to 18 feet deep; and 1% from 18 to 23 feet deep (which is .4 mile).
- Both systems result in abandonment of existing septic tanks.
- On-lot costs may not be covered if SRF funding is used for a STEP system
- Considering life cycle costs for construction and O&M, the two systems are comparable.
- It is recommended that the Project Team investigate the history of spills (based on miles and age) and characterize the inherent risks of both Gravity and STEP collection systems.

Summary of Solids Treatment and Disposal

While Sub-Class B solids require the lowest capital costs, they have the highest risk for disposal costs and more stringent regulations in the future. Composted Class A bio-solids have the highest capital costs and annual O&M, but offer greater sustainability, flexibility, controllability, and are environmentally friendly.

Facultative ponds offer the least amount of solids generation and handling.

BIO-SOLIDS	PROS	CONS
Sub Class B	• Lowest capital cost for treatment • Low annual O&M • Flexibility to be upgraded • Low acreage requirements	• Produces greatest volume of sludge • Most restrictive disposal option and highly dependent on availability of receiver sites • Largest carbon footprint: highest hauling costs and traffic nuisance • Produces lowest quality of sludge; may require additional treatment for disposal • Risk of substantial increase in hauling costs and more stringent regulations
Digested and/or Heat Dried Class B	• Produces lower volume of sludge • Lower hauling costs and traffic nuisance than Sub-Class B • Flexibility for future upgrade • Greater range of disposal options • Smaller footprint • Digestion is amenable to odor control • Heat-dried reduces volume of solids and has potential to generate Class A bio-solids	• Higher capital cost for treatment • Higher annual O&M • Higher energy use for heat dried • Heat-dried has higher capital costs and O&M, requires complex operations, generates dust, and has higher potential for odors
Composted Class A	• Produces lower volume of bio-solids, minimal hauling costs • Produces highest quality of bio-solids with greatest range of disposal options • Potential regional solution • Potential revenue generation	• Higher capital costs • Higher annual O&M • Requires supply of bulking agent and adequate user demand • Future regulations may limit direct land application
Facultative Ponds	• Requires no ongoing sludge treatment or disposal. Ponds would be dredged approximately every 20 years, with amortized costs of $30k- $50k per year.	

<u>COMMENTS</u>

- Solar drying is low in construction costs but requires additional acreage and may present an odor issue.
- STEP/ STEG collection system significantly reduces the volume of solids produced.
- Community may be willing to pay a higher cost to achieve a higher quality of bio-solids to ensure sustainability and controllability.

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Summary of Effluent Reuse/ Disposal

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Since the groundwater basin is the sole source of water supply, the way treated wastewater effluent is managed will have a major influence on the sustainable yield of the basin in terms of both volume and quality.

It appears that no one disposal option can provide benefits of seawater intrusion mitigation and accommodate the full requirements of the wastewater system - it will require an array of options to accomplish both. Broderson should be part of any project in order to assure maximum recharge of the aquifer.

Due to the cost of land acquisition as well as water lost to the groundwater basin, disposal at spray fields are best viewed as a start-up plan and emergency discharge option. In lieu of purchasing spray field property and installing associated transmission pipelines, the purchase of ag land within the basin provides a water supply benefit, and may not result in a higher total project cost.

DISPOSAL	PROS	CONS
Spray Fields Capacity 1190 AFY Mitigation = -0-	• Greatest capacity (up to 1190 AFY); with start-up operations and emergency discharge. • Lower treatment requirements (tertiary and denitrification treatment probably not required) • Future flexibility • Purveyor and/or third party participation not required	• Zero Seawater Intrusion (SWI) Mitigation • Substantial, long-term negative impact on groundwater balance; no agricultural reuse/ exchange. • Greatest footprint and highest land costs • Higher capital costs for pipe to fields • Potential environmental impacts of trenching pipelines • Salt loading in soils
Cemetery Reuse Capacity 50 AFY Mitigation = 5 AFY		• Limited capacity (50 AFY) • Minimal SWI Mitigation factor • Tertiary and partial denitrification required • Requires contract with end user
Agricultural In-lieu Capacity 460 AFY Mitigation = 46 AFY	• Potentially reduces pumping large volumes from aquifer • Flexibility to upgrade to Ag Exchange	• Low SWI Mitigation • Tertiary and partial denitrification required • Requires contract with end user, which may take time to obtain
Agricultural Exchange Capacity 460 AFY Mitigation = 250 AFY	• Highest SWI Mitigation	• Tertiary and partial denitrification required • Requires contract with end user, which may take time to obtain • Requires purveyor participation
Broderson Capacity 448 AFY Mitigation = 100 AFY	• Moderate capacity (448 AFY without Harvest Wells) • Moderate SWI Mitigation factor • Purveyor participation not required • Already owned by CSD • Only method studied to directly recharge upper aquifer	• High capital costs • Distance from out-of-town site increases piping costs • Higher treatment required - full denitrification • Construction impacts and costs from monitoring wells • Large footprint and high land value ($4.7M) • High risk of more stringent DHS regulations in future • Capacity greater than 448 AF requires harvest wells, incurring additional capital costs, annual O&M, and purveyor participation • Grading impacts on habitat (initial construction and reconstruction every 10 years

COMMENTS

- According to the most recent studies, it is possible to meet the demand for water using only the groundwater basin as the source of supply. However, this is highly dependent on the implementation of an agricultural exchange program of sufficient size and the use of the Broderson leach field.
- Cemetery and agricultural reuse options are in proximity to the east-of-town sites. These areas are located a great distance from drinking water supply wells, and irrigation of recycled water is applied at agronomic rates.
- All disposal options except Broderson require winter storage. The long detention time of treated wastewater and extended exposure to sunlight, provides a supplemental level of treatment.
- Liquefaction, water application rates, surface erosion, and landslide risks are community concerns. The availability of multiple disposal options will allow for the gradual ramp up, testing, and verification of performance at Broderson.
- NWRI: If Broderson is used, it is important to evaluate compliance with new DHS Groundwater Recharge Reuse criteria.
- The TAC recognizes the fact that water supply operations and wastewater disposal practices require a highly coordinated approach. However, the TAC believes that the wastewater and water purveyors should agree to manage the basin in a manner that will ensure costs are equitably shared.